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The Time Cost of Children and Equivalent Full Incomes

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The Time Cost of Children and Equivalent Full Incomes

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Abstract

When defining and estimating the cost of children and equivalent incomes children's consumption is normally defined as the household's cash expenditure on consumption goods for children. In fact, a heavy item in the cost of children under school age is time. This paper examines the cost of children and the definition of equivalent incomes in a simple model where income is full income as defined by Gary Becker, while time spent caring for children at home is unpaid work. Equivalent full income for a household with pre-school children is defined. It is also shown that as long as the wage rate is higher than the price of child care, the parents' participation in paid labour will be the same whether the care time is compensated for by free child care or as a lump sum. Both kinds of compensation will increase parents' consumption of leisure. It is therefore argued that, in the absence of reliable data for full income, time studies provide a useful welfare indicator by giving data for leisure.

The assumptions of the model are discussed both from the point of view of welfare analysis, and from the point of view of the capability approach to human well-being.

*Draft. Please do not quote

1 Introduction

Equivalent incomes

Let the size and composition of households be characterised by a vector z and let household income be y. For simplicity, I shall assume that all households face the same prices. The households have the same indirect utility function $V(y, z)$.

For two households with different compositions z_0 and z_1 the corresponding incomes y_0 and y_1 are *equivalent incomes* if

$$U = V(y_0, z_0) = V(y_1, z_1) \tag{1}$$

There exists a pair of equivalent incomes for every level of utility, U, and they are not necessarily proportional.

If the reference household is a couple without children, while z_1 represents a couple with one child, the cost of a child could be defined as

$$C_{CH}(U) = y(U, z_1) - y(U, z_1) \tag{2}$$

where $y(.)$ is the cost of living function implicitly defined by (1).

I shall argue that the cost of children includes time spent on care and supervision, and that the income concept in (1) and (2) should be full income. But first the utility function used needs to be considered.

The utility function of a household consisting of several different people is, of course, not a simple concept. There are various interpretations in the literature, such as the utility function of the parent(s) or a social welfare function defined on the individual utilities.[1] In my view, the preferable interpretation is that of Blackorby and Donaldson (1991): the distribution within the household is such as to achieve the same utility level for all its members. The utility, U, then represents the utility level of an arbitrary member of the household. Indeed, this interpretation is the only useful one for a welfarist distributional policy based on ethical individualism. But then we run into another difficulty, that of defining the utility function of a child.[2] Rather than postulating that the child has preferences with a corresponding utility function, I shall base the following analysis on the assumption that the child has needs which the parents satisfy.

The utility functions in (1) and (2), when referring to the parents, can be conditional or unconditional. The unconditional utility of the parents

[1] For detailed references, see Blackorby and Donaldson (1991), Brown xx or Lind(2001)

[2] For a discussion of the problem of defining children's preferences and utility, see Bojer (2000)

includes their utility gain from having children. The idea of defining equivalent incomes to include the utility gain from having children stems from an influential paper by Pollak and Wales (1979). The majority of researchers analysing income distribution pay lip service to this paper, but prefer to base their analysis on conditional utility. The reason for choosing to work with conditional utility is that this is the reasonable approach when we are concerned with the welfare of the children.[3] Terms used to express the idea of (parent's) conditional utility are 'economic well-being' (Blackorby and Donaldson 1991) and 'material well-being' (Smeeding and Weinberg 2001). I take it that the concept of economic or material well-being does not imply that leisure is necessarily excluded.

Because parents and children live together and consume together, and since, furthermore, children are almost wholly dependent on what their parents choose to give them, it is impossible to analyse the welfare of children separately from that of the parents. Whether the primary purpose of the analysis is to study the welfare of the parents or that of the children, the two must be analysed together, simultaneously. A suitable interpretation of the concept of an 'equivalent income' is that it indicates how well parents are able to provide for their children, given that they themselves should also be able to achieve a certain level of (economic) well-being.

The needs of children

Children need consumption goods and care. Care requires the time of one or more adults. The necessary time can be provided either by one or both parents, or by paid professionals (day care centres, nursery schools, nannies), or a combination.

It is plausible to assume that both the volume and the composition of children's needs vary with age. New born infants need care, or at least supervision, 24 hours a day. Their individual consumption needs, such as food and clothing, are fairly small. As the child grows older, the time needed for supervision decreases while material consumption increases. While the need for time diminishes with age, it seems reasonable that it does not become zero as long as the children are minors; in Norway, under 18 years old. But there is a sharp decrease in the need of time from parents or professionals paid by the parents when the child starts school. Elementary school is free in most countries, but parents normally have to pay for day care for younger children.

For consumption goods, the realistic approximation from a certain age on,

[3] See e.g. Deaton and Muellbauer 1981: 211.

would seem to be that of proportionality to the consumption of the parents. There are several reasons for this. One is that parents and children live together and normally take their meals together. It is reasonable to assume that parents buy consumption goods for their children of the same kind, of the same quality and in the same amounts that they buy for themselves. The norm in contemporary society seems to be that parents and children should have roughly the same standard of living, suitably modified to children's different needs.

Given that infants need care 24 hours a day, and that all children need some time from adults, time becomes an item in the cost of children as soon as we cease to assume that the mother's time has zero economic value. In order to include time cost of children, the income concept must be that of full income.

Full Income

As is well known, the concept of full income was introduced by Gary Becker (1965). The full income, FI, of an individual is defined as:

$$FI = wT + M \tag{3}$$

where w is the wage rate, T available time (24 hours a day) and M is non-labour income. Full income shows the real flow of economic resources at the person's disposal for a given period of time, which she may allocate between market consumption, home production and leisure according to her own preferences. The concept brings out the fact that leisure is an economic good on a par with consumption goods and that time is an economic constraint.

Although widely used in analysis of the labour supply of married women, full income has not (yet) been adopted as the variable to be measured in analysis of income distribution. The reason may be that for full income to be a relevant measure of 'material well-being', the individual has to be able to choose freely between paid work and leisure, and this assumption is not always realistic. When Becker first published his theory of the allocation of time in the 1960s, it was normal for adult men, when employed, to work full time, while their spouses were, or felt they ought to be, full time housewives. Inequalities in income could therefore safely be assumed to be chiefly due either to inequalities in wage rates or in non labour income, not inequalities in leisure, while the value of a married woman's time could be assumed equal to zero.

But during the last thirty years or so, the labour market in the industrialised world has changed profoundly. In many countries, women make up

nearly half of the paid labour force, and it is normal for married women to have paid work outside the home. However, many married women choose to work part time while the children are small. In this situation, inequalities in cash income are often due to differences in paid working time. In Norway, the greater part of inequalities in women's earnings can be explained by differences in paid working hours. (Bojer 1995) There are indications that inequalities in household income also largely stem from differences in the number of income earners and their hours of work. (Statistics Norway yy)

2 The model

Constant Child Consumption

The unit of analysis is a household with one child under school age. The adults consume two goods: consumption, X, and leisure, F. The household has one single utility function: it is either a one person household or a couple in perfect harmony in the sense described above: their utility levels are equal. Since the purpose of the model is not to analyse division of labour within the household, the household faces one single wage rate in the market, w, and there is a single time constraint.

No utility function for the child is included in the model. The child is instead assumed to have needs which are satisfied by the parents.

We begin by assuming that the child's consumption is a fixed amount, X_{CH}. The parents consume X_A. The child also needs a fixed amount of hours of care, T_{CH}. This time again consist of two parts, T_0 and T_1. The first part, T_0, is care that must be carried out by the parents. The second part, T_1, can be perfectly substituted by paid child care at the rate of p per unit of time. Time spent caring for the child will be treated as work, not leisure.

Before the arrival of the baby, the behaviour of the parents can be described by the standard text-book model of labour supply. They maximise the utility function $U(X_A, F)$ subject to the total time-money budget constraint: $wT + M = X_A + wF$. With the child, the parents face a budget restraint that is different in terms of both time and money.

The new time constraint T_0 is absolute. The time period T_1 can be spent in one of two ways. One way is working in the market while paying for child care. The net wage rate during this period is $w - p$, which may be positive or negative. If it is positive, the parents will, of course, prefer paid work to unpaid work, however small the net wage rate. If $w - p$ is negative, they will care for the child at home.

Consider first the case $w - p > 0$. The parent's utility function is unchanged. The child's needs are absolute, and must be covered before the parents can decide on their own choice between consumption and leisure. The child's needs in money are $X_{CH} + pT_1 + wT_0$. Converted into time, the needs are :

$$\frac{1}{w}X_{CH} + \frac{p}{w}T_1 + T_0$$

The time-money budget constraint of the parents is:

$$X_A + wF = wT - wT_0 - pT_1 - X_{CH} + M \tag{4}$$

Figure 1: Case A: $w > p$

The situation of the parents is shown in figure 1. To simplify, it is assumed that $M = 0$. Top indexes 0 and 1 denote consumption and leisure before (0) and after (1) the child. From the budget constraint (4), it is seen that p does not affect the slope of the budget line, which depends on w only. The needs of the child simply shift the budget line inwards. The shift can be interpreted as follows: the parents first have to work for T_0 hours caring for the child, then for $\frac{p}{w}T_1$ hours to pay for outside child care, lastly for $\frac{1}{w}X_{CH}$ hours to pay for the child's consumption. At that point on the time-axis, they can begin to consider their own preferences for consumption and leisure.

The parents' consumption and leisure will, of course both decrease (on the plausible assumption that they are both normal goods). But their cash income may well increase unless T_0 is very large. Let the hours of paid work be H. Cash income after the arrival of the baby is:

$$M + wH = X_A^1 + X_{CH} + pT_1 \tag{5}$$

Equation (5) shows that the cash cost of the child is not X_{CH} but $X_{CH} + pT_1$. Even if we regard the 'material well-being' of the parents as consisting of consumption only, we must deduct both expenditure on child

consumption and child care from the parent's cash income in order to measure their consumption.

The full time and money cost of the child is

$$FC_{CH} = wT_0 + pT_1 + X_{CH} \tag{6}$$

It is determined by the wages of the parents and the cost of outside child care. It is also the sum needed to compensate the parents fully.

The compensation needed when $w < p$ is $wT_0 + wT_1 + X_{CH}$. The equivalent full incomes are:

$$EFI = wT + wT_0 + pT_1 + X_{CH} + M \tag{7}$$

when $w > p$, and

$$EFI = wT + wT_{CH} + X_{CH} + M \tag{8}$$

when $w < p$.

In both cases, after compensation, and unless T_0 is very large, the parents will divide their time between work and leisure exactly as they did before the arrival of the baby. Work time, however, will now be divided between unpaid work, T_0 or T_{CH}, and paid work, shown as H on the old budget line in figure 1. The implication clearly is that less time will be spent on paid work than before the arrival of the baby.

In the presence of fixed needs, independent of the income of the parents, the concept of equivalent scales does not appear to be a useful one. To calculate equivalent incomes for couples with and without children, the straightforward measure is to deduct the full cost of children, where present, from full income.

Benefits to parents may be given as subsidised child care, a lump sum or a combination of the two. For parents whose wage rate is sufficient to pay the full price for child care, the form of benefit will make no difference since the slope of the budget line is unchanged, and they choose outside child care in any case. But for parents with low wages, a lower p will make a difference if the sign of $w - p$ changes.

The above model does not distinguish between two-parent households and single providers. The difference between them lies in the value of T, which will be exactly twice as large for the two-parent household as for the single provider. In this way, the concept of full income is suitable for representing the full difference in resources between the two types of household. The child's needs represent a far larger *share* of the single provider's resources than when both parents are present. The single provider may well be time

poor even if not money poor. The model also shows the quandary of the low paid ($w < p$) single mother who cannot afford to pay for professional child care and who is poor both in terms of time and money.

Proportional Child Consumption

Consumer unit scales presume proportionality between the child's and the parents' consumption. Assume $X_{CH} = aX_A$ in a two parent household.[4] The proportionality may be the result of some mechanism of decision making within the household, or it may simply be a societal norm observed by the parents.

With a constant, the time-money budget constraint of the parents becomes :

$$(1+a)X_A + wF = wT - wT_0 - pT_1 + M \tag{9}$$

In this case, the presence of the child changes the slope of the budget constraint to $w/(1+a)$. The effect will be the same as that of a reduction of the real wage rate. The results are well known from text-books: work hours will decrease or increase according as the substitution or the income effect is the stronger. The substitution effect on work hours is always negative: it pays for the parents to substitute leisure for consumption.

The full time and money cost of the child in this case is

$$FC_{CH} = wT_0 + pT_1 + aX_A^0 \tag{10}$$

An increase in non-labour income equal to the sum in (10) will enable the parents to choose the same combination of consumption and leisure as they had without the child. But since they can obtain increased utility by substituting leisure for consumption, the increase may be an overcompensation in terms of parents' utility. But observe that increasing leisure may not be feasible if T_0 is very large.

In all other cases, full compensation of the time and money costs of the child, restoring parents to the previous indifference curve, will imply increased leisure as compared to the situation before the arrival of the child.

Time studies in Norway show that parents of children under school age have less leisure than active adults without children.[5] The studies classify housework and child care as unpaid work, not leisure. The above analysis shows that leisure is an indicator of the parents' welfare. If a couple with children has a full income equivalent to the income of a couple without

[4] The parameter will of course be nearly twice as large for a single parent. The exact difference depends on the extent of household economies of scale.

[5] Haraldsen and Kitterød (1992), table 11 p 77

children, they will never choose less leisure than the childless couple, and sometimes more. In the absence of data for full income, data from time studies should therefore be published along with income data to give a more complete picture of the welfare of families with children.

3 Child care: work or leisure?

But is it acceptable to represent child care as unpaid work in the parents' utility function? The parents enjoy spending time with their children, don't they? Well, I would suggest that sometimes they do, sometimes they don't. Moreover, many people also enjoy their paid work. For example, stay at home parents often claim to miss the social interaction with other adults that they have at work.

According to the *Oxford English Dictionary*, the word 'leisure' means 'free time'. Free time is time when we can freely choose what to do: watch television, engage in physical training, bake bread, polish our nails, twiddle our thumbs or play with the children if we so wish. In the presence of children's needs, much of the time not spent in paid work is also not free time. Nappies must be changed and the baby fed, whether the parent feels like doing this right now or not. Caring for children is similar to being at work in that both activities entail duties that cannot be put off, and that have to be carried out regardless of personal preferences at the moment. Both activities are sometimes enjoyable, sometimes not.

Child care is not only a moral duty, it is a legal obligation. Most (all?) countries have laws that legally oblige parents to nourish and care for their children. Child abuse is, of course, punishable by law, but so are less extreme forms of neglect. In this sense, then, the duty to children is stronger than the obligation to go to work.

Assuming that child care is unpaid work is not the same as assuming that parents do not gain utility from the fact of being parents. People choose to have children for a variety of reasons, such as continuing their genes, having heirs, or providing for their old age, none of which implies that they enjoy spending time with them. Indeed, wealthy parents through the ages have frequently left their offspring to the care of wet nurses and nannies, and many fathers, whether wealthy or not, spend very little time with their children. These parents presumably still enjoy the fact that they are parents.

The important difference between work and leisure is precisely that leisure is free time, while work entails loss of freedom. This is why I find it reasonable to treat paid work and caring for children as equal with respect to parents' preferences.

4 Welfare or capabilities?

To my mind, the above discussion demonstrates difficulties inherent in the welfarist approach to measuring income. It is possible to observe the choices people make, but not their motives for them. Therefore, if we take seriously the idea that income should measure welfare, the method of measurement must depend on a set of arbitrary assumptions about people's motives for choice. When parents enjoy taking care of their children, they derive utility from this activity, and the time spent is not a cost in welfare terms. But when they (as many surely do) take care of the children because it is their duty to do so, there is a time cost. When motives are mixed, as they also surely often are, there is no clear welfarist method for measuring the cost of children, as far as I can see.

The capability approach of Amartya Sen[6] and Martha Nussbaum (2001) does not encounter these difficulties. There is another difficulty however, namely that no agreement has yet emerged as to which are the important capabilities to be measured. Sen has deliberately not (yet) given more than some examples of capabilities. Nussbaum has proposed a list of ten types of important capabilities, but her list is neither widely known nor universally agreed to by those who know it. However, it seems to me that the capability of earning ones living must be on any list of important capabilities. The concept of full income is, at the very least, a strong candidate as a measure of this capability.

The definition of leisure given in section 3 makes sense in a capability framework. No utility analysis or discussion of parents' motives is needed. It is clear that having children reduces the parents' capability both for leisure and for earning money.

What remains is to estimate the needs of children. Estimating time needs should not be complicated. Consumption needs might well be either larger or smaller than what is observed from surveys of consumer expenditure.

A capability approach to measuring income would also free the economics profession from the problem of distinguishing between conditional and unconditional utility functions, and form the absurd project of estimating parents utility gain from children.

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[6] See e.g. Sen (1993)

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